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EMERGENCY COOLING OF NUCLEAR POWER PLANTS.

ENVIRONMENTAL PROTECTION AGENCY, RESEARCH TRIANGLE PARK, N.C.

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EMERGENCY COOLING OF NUCLEAR POWER PLANTS
[Notkühlung von Kernkraftwerken]

by

BJM

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Recently, concerned statements by various press sources on the problem of emergency core cooling in nuclear power plants have caused the Federal Ministry of the Interior to take a position on this problem as part of its new responsibility for questions of reactor safety. In order to be prepared for a coolant loss due to a pipe break, which is assumed to be the most likely accident, emergency cooling systems must be provided to guarantee that the heat liberated in the reactor core even after it is shut down will be led off so effectively that the fuel elements are largely or completely prevented from melting, thus avoiding pressure-generated chemical metal-water reactions. This is necessary so that the safety vessel surrounding the reactor can carry out its job of sealing the reactor off hermetically from the outside world to prevent the release of radioactive substances.

The steadily increasing output of a nuclear power plant due to technical progress and the related increases in potential for danger caused the then

responsible subdivision for anti-radiation measures and safety of the Federal Ministry for Education and Science, even at that early point, to pursue information on all problems associated with emergency core cooling, with particular emphasis on the first plants with electrical outputs of more than 1000 MW, which had just applied for approval. In this sense, the Reactor Safety Commission became involved with this problem at an early point. The related discussions and studies, which also took into account the results and perspectives of current work in West Germany promoted by the Federal Government as part of the Research Program on reactor safety by means of emergency core cooling, occupied the Reactor Safety Commission again in the Spring of 1972, and resulted in the following provisional declaration:

"As a concrete recommendation of the Reactor Safety Commission on granting operating approval to future light-water reactors, the Commission considers it necessary that answers be obtained by experiment to the emergency-core-cooling-related questions of reliably assessing the maximum temperatures and thus the scope of possible metal-water reactions during a coolant-loss accident. The Reactor Safety Commission considers this especially necessary since the reactors up for approval have considerably greater output and thus a considerably greater need for afterheat removal than plants already in operation."

American reports on discussions relative to the problem of emergency core cooling, which took place in the spring of 1972 between members of a German Government delegation and representatives of the American licensing authorities at the USAEC, initially gave rise to erroneous statements on an alleged moratorium on nuclear power plants in West Germany. However, there is no question of any moratorium announced by the authorities. Nevertheless, the quoted position of the Reactor Safety Commission clearly states that the Reactor

Safety Commission will make its position on operating approval for light-water reactors with greatly enhanced output dependent on experimental investigations providing greater knowledge applicable to assessment criteria for relevant questions of emergency core cooling. Domestic and foreign results, in particular the already available interim results of the research promoted by the Federal Republic in the field of emergency core cooling make it likely that the assumptions upon which emergency core cooling is based will be confirmed. If, however, counter to expectation, the advance calculations are confirmed only partially by the final technical results, there is still the basic possibility of matching the emergency core-cooling capacity to the output or reducing the power to guarantee the emergency core cooling.

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